Condensed Matter Physics

EFFECT OF HUMIDITY ON Pd AlN/Si AND Al/AlN/Si THIN FILM STRUCTURES FOR BALANCED HYDROGEN SENSORS

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Balanced metal-insulator-semiconductor (MIS-type) device structures of Pd/AlN/Si and Al/AlN/Si for hydrogen sensing have been developed using a combination of Pd and Al metal gates on an AlN/Si substrate, where the Pd gated device senses H_2 in the environment and the Al gated device acts as a reference for measuring the signal.[1] While the selectivity of this device in the presence of other gasses as well as its sensitivity to ppm amounts of hydrogen has been previously demonstrated, it suitability for applications operating under high humidity conditions, for example, applications in hydrogen fuel cells, requires further evaluation. To study the performance of the sensor in such an environment, these devices have been tested in the presence of water vapor. A series of capacitance-versus-bias voltage and capacitance-versus-time measurements have been performed on these device structures in the presence and the absence of water vapor. Results of these measurements indicate that the device does not respond to water vapor. The analysis of the effect of water vapor on the device performance will also be discussed.

[1] H. E. Prakasam, S. Flaminia, C. Huang, G. W. Auner, L. Rimai, S. Ng, and R. Naik, MRS symposium proceedings, I11-27, 2002.

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